Local Chemical Order Altered by Magnetic Annealing in $Fe_{22.5}Ni_{77.5}$ Permalloy

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X-ray diffuse scattering was measured on $Fe_{22.5}Ni_{77.5}$ and $Fe_{46.5}Ni_{53.5}$ alloy samples. These samples were heated to 450°C, held for 4 hours and then furnace cooled in applied magnetic field of 1000 gauss along [100] direction of the crystal. Large change in the superstructure reflection intensities from the $Fe_{22.5}Ni_{77.5}$ permalloy at different directions relative to the applied field and with no field was clearly observed, (see following Figures) while the change in $Fe_{46.5}Ni_{53.5}$ is negligible. The dramatic increase in the directionality of the atom pairs perpendicular to the applied magnetic field on annealing is direct confirmation of the atom-pair alignment hypothesis and eliminated other models.